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MICROBIOLOGICAL ANALYSES OF ARUM SAMPLES

FOR BOOJUM RESEARCH

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DEARBORN

OBJECTIVE

To obtain supportive microbiological data to indicate whether Boojum Eco-engineering processes are active in an amendment-treated site.

SAMPLES

Two samples were provided by Boojum Research for analysis on May 18, 1989. One sample in an opaque, 1 litre wide mouth bottle, labelled Denison Station I contained straw and hay. A small amount of fine beige sediment had collected on the bottom of the container. The other sample was collected in a 1L opaque wide mouth bottle and labelled Denison Station B. It contained straw and hay and a substantial amount of fluffy yellow-brown sediment at the bottom of the container.

METHODS

All analyses were initiated within two days of receiving the sample. Microbiological analyses were conducted on the liquid of the shaken sample for all samples.

Chloride, nitrate and sulphate levels were determined by Ion Chromatography (Dionex). A CO_2 tablet was added to remove sulphide and this sample was filtered through a *0.45* micron filter prior to analysis.

ATP (adenosine triphosphate) was measured in a model 20e Turner designs photometer using the Firefly Luciferase assay.

Levels of sulphate reducing bacteria, iron reducing bacteria, and ammonifiers were estimated by end-point dilution in selected media prepared in a decimal series. Postgate E and F media were used to enumerate sulphate reducers, while casein medium (Canada Centre For Inland Waters Formulation) was used for ammonifiers. Iron reducing bacteria were enumerated in a minimal salt medium containing ferric iron and a mixture of peptone, yeast extract and lactate as a

carbon source. The yeast extract also served to supply growth factors. All tests were conducted at 28°C. The incubation period for all three culture tests was three weeks.

RESULTS AND DISCUSSION

Results are summarized in the attached table.

Of the major strong acid anions, sulphate represent the main contribution to the acidity of the sample.

The microscopic analyses reveal that relatively high numbers of micro-organisms in the samples, while the ATP data indicate that most of the total biomass is alive.

The cultural tests indicate that alkalinity generating micro-organisms are present in the samples.

The iron reducing bacteria count in Station B was particularly high.

CONCLUSIONS

Active microbial populations appear to be established at both sites. The populations include organisms capable of generating alkalinity. However, it appears that there activity has been insufficient to raise the pH at the sample site.

TABLE 1 MICROBIOLOGICAL ANALYSES OF ARUM SAMPLES - MAY 1989

TEST	DENISON STATION I	DENISON STATION B
Free Mineral Acidity (ppm acidity as $CaCO_3$)	400	900
pH	3.2	2.6
Chloride (ppm as Cl^-)	17	29
Nitrate (ppm as NO_3^-)	< 10	< 10
Sulphate (ppm as $SO_4^=$)	1440	3930
ATP (nanograms per mL)	150	16
Direct Microscopic Counts (cells per mL):		
Algae	$< 10^4$	10^4 (diatoms only)
Bacteria	10^8	10^7
Molds	$< 10^4$	$< 10^4$
Sulphate Reducing Bacteria (# per mL)	E 10^2 F 10^3	E 10^2 F 10
Iron Reducing Bacteria (# per mL)	10^3	$> 10^5$
Ammonifiers (# per mL)	10^4	10^3

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